

Notice of Allowability

Application No.

10/762,470

Examiner

Johannes P. Mondt

Applicant(s)

HORIGUCHI, FUMIO

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to After-Final Amendment (12/27/05).

2. ☒ The allowed claim(s) is/are 1-5,11-15,22 and 23.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some* c) ☐ None of the:

1. ☒ Certified copies of the priority documents have been received.

2. ☒ Certified copies of the priority documents have been received in Application No. 09/949,634.

3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.

(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 1/13/06.

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____.

NATHAN J. FORT
SUPERVISORY PATENT EXAMINER
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DETAILED ACTION

Response to Amendment

Amendment filed 12/27/05 forms the basis of this office action. Said Amendment has been entered. The Replacement Sheet submitted with said Amendment has been approved. The objections to the Drawings have been withdrawn. Said After-Final Amendment places the application in condition for allowance except for five informalities (see Examiner's Amendment). The Amendment to the Specification submitted with said After-Final Amendment has been approved.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Applicant's Representative E. Garlepp (Reg. Nr.: 45,330) on 01/13/2006.

The application has been amended as follows:

In claim 5: the wording "surface thereof" (line 3) has been replaced by "surface of the silicon substrate".

In claim 5: the wording "having a trench width A" (lines 3-4) has been replaced by: "having a trench width".

In claim 5: the wording "a gate electrode formed over the channel portion; the gate electrode being formed over the channel portion with the gate insulating film

interposed therebetween" (lines 15-18) has been replaced by: "a gate electrode formed over the channel portion with the gate insulating film interposed therebetween".

In claim 22: the wording "grid of trench" (line 2) has been replaced by: "grid trench".

In claim 23: the wording "grid of trench" (line 2) has been replaced by: "grid trench".

END OF EXAMINER'S AMENDMENT

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

(a) **Claims 5-8 and 11-15** are allowed because previous claim 5 has been amended to include the limitations defined by former claim 16, previously stated to contain allowable subject matter (see previous action mailed 8/24/05): closest art found is Goebel et al as cited. However, Goebel et al do not teach the plurality of silicon columns to form an array of matrix form with one pair of the silicon columns at both corners on a diagonal line of the matrix form lacking. No other art has been found over which this limitation is obvious.

1. **Claim 22** is allowed because previous claim 22 has been amended to include the limitations defined by former claim 13, previously stated to contain allowable subject matter (see previous action mailed 8/24/05): closest art found is Goebel et al as cited. However, Goebel et al do not teach the limitation that an aligning pitch of the silicon columns in an extending direction of the bitline to be made (or to be) loose at a site

where the second impurity layer is connected to the connection line at the bottom of the trench. No prior art has been found over which this limitation is obvious.

2. **Claim 23** is allowed. The following is a statement of reasons for the indication of allowable subject matter: within the context of the semiconductor memory device defined by former claim 5 the limitation that the second impurity layer is united with respect to adjacent three or more of the silicon columns on the bottom of the trench is not taught by Goebel et al, which was found to be the closest art. No other art has been found over which this limitation is obvious.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3663

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM

January 13, 2006